considerations," the study predicts. Federal and provincial governments, industrial and financial organizations and academic institutions must co-ordinate and define the roles they will play in planning Canada's energy supplies for the years ahead, according to the Council.

The pivotal energy transition period will begin around 1990, says the study, with "a significant supply and use of heavy oils, oil sands, coal and nuclear energy. Conventional crude oil and natural gas will increasingly be allocated to critical and special uses. Early in the next century, Canada can expect substantial supplies, in aggregate, of liquid and gaseous hydrocarbons from coal, as well as energy from biomass and solar radiation. Emphasis must be placed on programs that will facilitate the necessary technical and economic transitions".

The Council recommends the following technical demonstration programs:

Fossil fuels
Oil and gas
– Technological capability for exploration and production of oil and gas in ice-congested waters.
– Transportation of hydrocarbons from the high Arctic by marine mode.
– Exploration and production of oil and gas in very deep waters.

Coal
– Fluidized-bed technology.
– Land reclamation after coal is strip-mined.

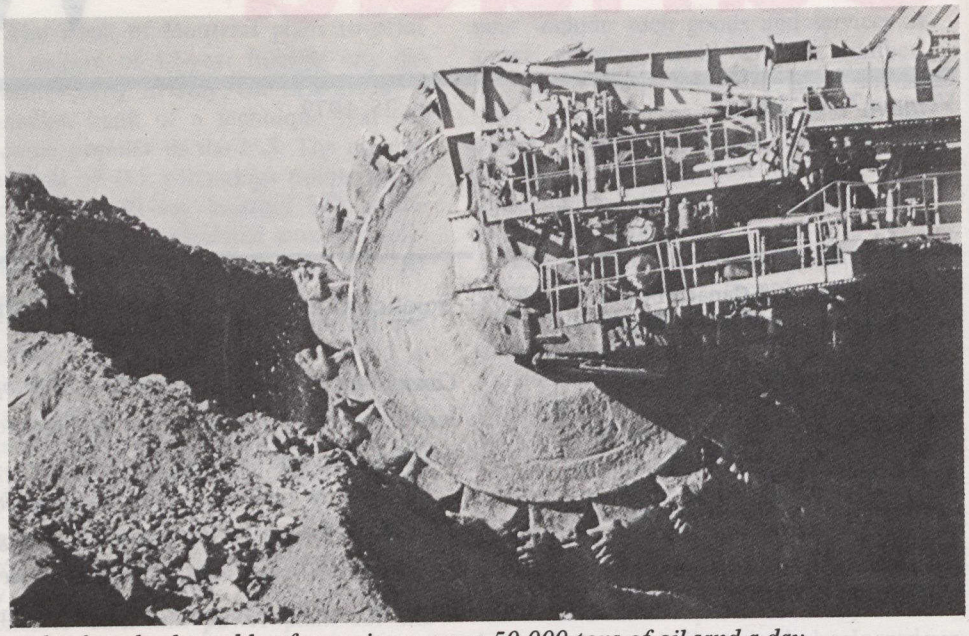
Nuclear energy
– Irradiated fuel management and disposal systems.
– Feasibility of the thorium cycle – inclusive of economic and systems aspects.

Renewable energy
– Generation of gaseous and liquid fuels from forest and agricultural residues – with an assessment of economic and commercial factors related to biomass energy technology.
– Solar water and space heating systems.
– Energy generation from solid wastes.

Conversion technologies
– Co-generation of electricity and heat – inclusive of economic and management aspects.

Long-term policies and priorities

Based on these concepts and on the relative magnitude of potential future contributions, says the report, "it would seem pertinent to recommend a tentative or preferred "shopping list" of sources or technologies". Energy sources and technologies that must receive appropriate attention, in order to have the required long-term impacts, can be ranked in decreasing order of priority:
– Nuclear fission: more efficient use of fuel resources
– Oil sands: *in situ* enhanced recovery processes
– Effective utilization of conversion energy in planned situations such as industrial parks
– Solar water and space heating
– Efficient energy use: new industrial processes
– Efficient energy use: continued commercial and residential building improvements
– Coal: conversion to liquid and gaseous fuels
– Energy storage: all systems
– Energy from biomass and solid wastes
– Efficient and advanced energy conversion
– Transportation efficiency
– Portable fuels: such as new hydrogen systems
– Consumer products: optimized materials and recycling
– Oil sands: new mining technologies



A bucketwheel capable of scooping up over 50,000 tons of oil sand a day.

Funding and management

With regards to funding and management of research, development and demonstration, the report states:

"...Fossil fuels have historically been developed by the private sector in Canada. Recognizing this, the designated private firm (or the public-private consortium) is likely to be the chosen instrument for demonstration programs and the principal source of funds. In the nuclear energy field, the Crown corporation, Atomic Energy of Canada Limited (AECL) is obviously the most appropriate institution....

"When an industry or a business firm is identified or designated as the chosen instrument for implementation of an energy policy, the onus is on government to play an enabling role through provision of financial support, the setting of an appropriate regulatory framework, and the use of ancillary government agencies to support and monitor the activity. When a government agency receives the mandate, however, the onus is on that agency to implement government energy and industrial policies in the relevant area, with timely involvement of industry for the adequate transfer of technology.

"This recommended approach is best understood through examples. The Canadian petroleum industry should play a leading role in demonstration of the technological capability to explore and bring to production, oil and gas resources in ice-congested and deep waters. Since the offshore and northern regions fall within federal jurisdiction, the federal government must design and enforce direction-setting regulations and encour-

(Continued on P. 8)